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(71) Applicant(s)
Northern Telecom Limited

(Incorporated in Canada)

World Trade Center of Montreal,
380 St Antoine Street West,8th Floor, Montreal,
Quebec H2Y 3Y4, Canada

(72) Inventor(s)
Christopher David Murton
Stephen Ian Roberts

(74) Agent and/or Address for Service
J P W Ryan
Northern Telecom Europe Limited, Patents and
Licensing, West Road, HARLOW, Essex, CM20 2SH,
United Kingdom

(54) Communications system

(57) A synchronous digital network has an associated external service network e.g. to provide data network services via a cable television network. Low speed asynchronous communications relating to management of the external service network are carried in packet form via the management communications channel of the digital network.

Fig.2

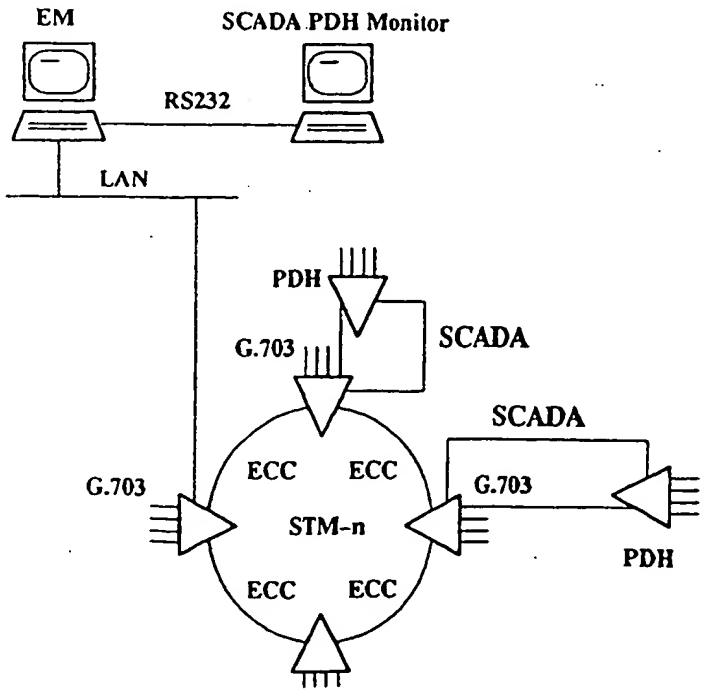

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Fig.1 (Prior Art)

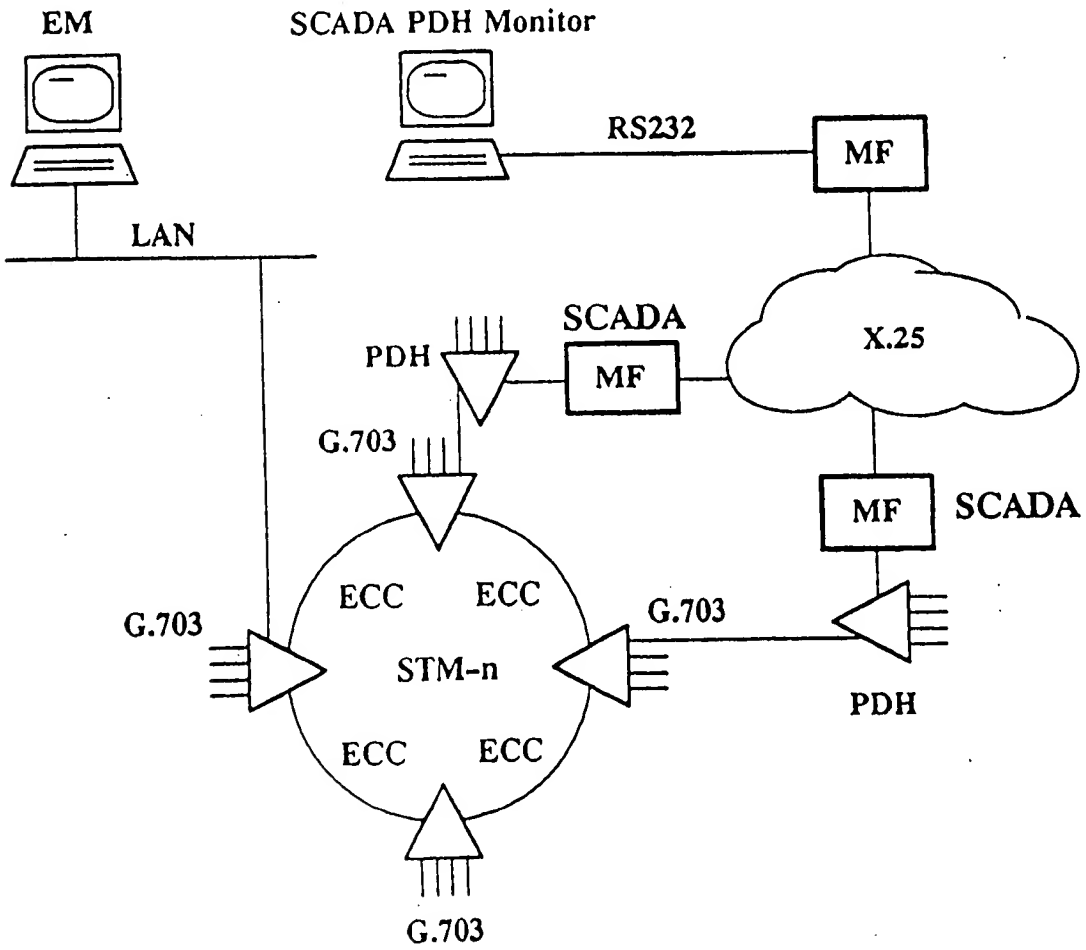
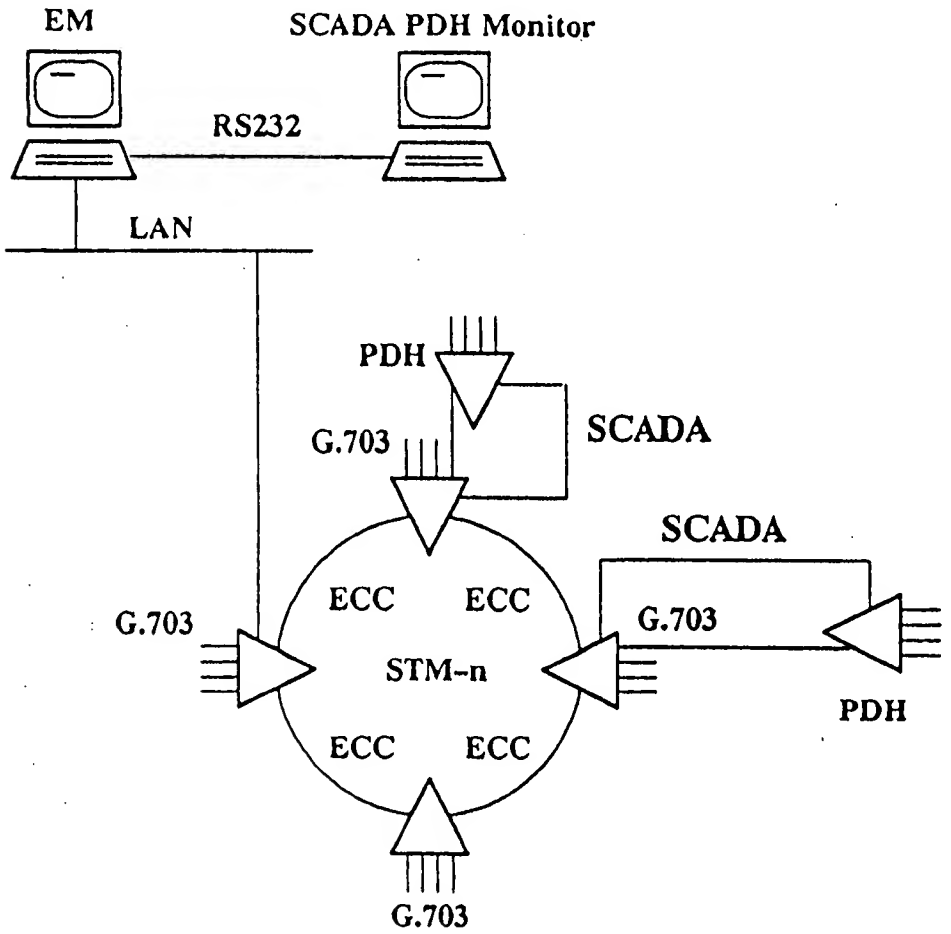


Fig.2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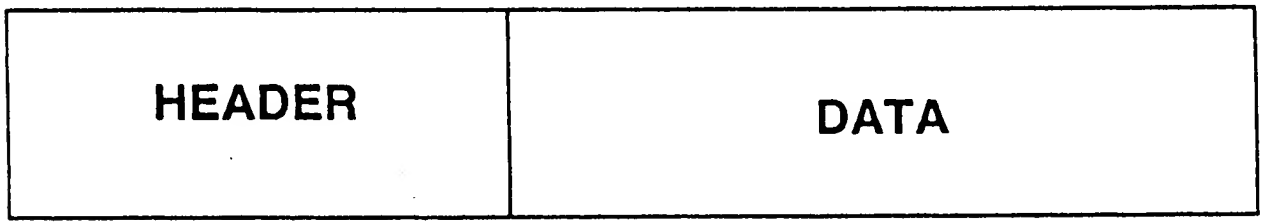
SCADA PDH Monitor
RS232
LAN
PDH
G.703
SCADA
SCADA
G.703
ECC
ECC
G.703
STM-n
PDH
ECC
ECC
G.703

Fig.3



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COMMUNICATIONS SYSTEM

This invention relates to communications systems and in particular to SDH (synchronous digital hierarchy) networks.

Synchronous digital networks, e.g. SDH networks have been introduced by telecommunications service providers. These networks are now being utilised by other service providers e.g. for the provision of telephone services by cable television companies or for the provision of data network services. These so called external services are generally asynchronous in nature.

The provider of these external services will in general service groups of subscribers each group being coupled to a local multiplexer providing access to the SDH networks. A particular problem for the external service provider is that of control or management of those items of equipment for which the external service provider has responsibility. For example the condition of local area multiplexers needs to be monitored to ensure that faults are promptly identified. Other control information may e.g. relate to the class of service provided to a particular subscriber or to the disconnection of subscribers who are in default of payment. At present this control/management information is carried by overlay and mediation functions installed in the network to transport co-located management information back to the relevant management system. Whilst this technique is satisfactory in operation, it is relatively costly to provide the associated equipment.

The object of the invention is to minimise or to overcome this disadvantage.

According to one aspect of the invention there is provided a synchronous digital network having an external service network associated therewith, there being means for transporting, via the management communication channel of the synchronous network, low speed asynchronous communications relating to the management of the service network.

According to another aspect of the invention there is provided a synchronous digital network having an external service network associated therewith, and means for transmitting management information relating to the service network in packet form via the synchronous network.

An embodiment of the invention will now be described with reference to the accompanying drawings in which:-

Fig. 1 shows in schematic form a typical (prior art) synchronous network supporting external services;

Fig. 2 shows a network system according to the invention;

and Fig. 3 illustrates the format of an asynchronous management information data packet employed in the system of Fig. 2

Referring to Fig. 1, which is introduced for comparative purposes, there is depicted a synchronous digital hierarchy (SDH) network arranged to support co-located external asynchronous services. The SDH protocol employs a general purpose management communication channel known as the embedded communication channel (ECC) which is used to control and obtain status information relating to SDH network elements which are specifically addressed. Incorporation of an asynchronous service into this network requires the provision of an X.25 overlay and mediation

function (SCADA) installed in the network to transport the asynchronous management information back to the relevant management system (SCADA PDH Monitor).

Referring now to Fig. 2, this shows an embodiment of the invention. This arrangement avoids the need for overlay and mediation functions by transporting the external low speed asynchronous communications via the SDH management communications channel.

The information from the co-located equipment is packaged up so that it may be transported to the relevant manager. To achieve this, the system exploits the nature of these systems which are polled response i.e. a master initiates communication with slaves (equipment), and only the addressed equipment will ever respond. A slave equipment can never send unsolicited messages.

The form of the data packet is shown in Fig. 3. The packet includes a leader portion incorporating routing/address information appropriate to the SDH network, and a data portion which carries the asynchronous information. The packet is routed by the SDH network corresponding to the address contained in the header, i.e. to the management location.

At the management location, the information from the non SDH manager is examined to identify which slave equipment is being communicated with. The addressing information is used to identify the SDH network element where the slave equipment is located.

The location of the addressing routing function is in the overall management domain. An address routing table can either be manually entered or may be derived by use of a suitable algorithm based upon a learning broadcast method.

The information is now in the SDH domain with the relevant addressing header. The message will now be delivered to the correct SDH network element using the OSI comms stack.

When the message arrives at the SDH network element, it is identified as destined for external equipment by the fact that it will arrive from a specific transport connection. In an alternative arrangement a similar function may be achieved at the application level. The information is routed to the relevant port(s) to which the co-located equipment is connected and only the correct co-located equipment will respond.

The information from the co-located equipment is packaged up by the SDH network element to send the information to the correct destination manager. Depending on the implementation, the address will be either the SDH element manager, a mediation manager or the final manager. A routing table may or may not be required at the management end depending on the application.

Use of this technique will of course incur a time delay in the assembly and transmission of the data packet (the store and forward delay). However, we have found that, in use, this delay is sufficiently small that its effects are not perceptible to system users.

In simple polled response system, no routing table is required as the information will always be destined for the non SDH manager. In more complex system, where there are more than one type of non SDH manager, an addressing table will be required, to filter off the information to the correct manager.